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(54) Title: OPTICAL RESONATORS WITH DISCONTINUOUS PHASE ELEMENTS

(57) Abstract

A discontinuous phase element (86, 204) is disposed between the reflector (20, 23) elements of an optical resonator in order to suppress unwanted modes propagating within the cavity, and to preferentially allow the existence of preferred modes within the cavity. The discontinuous phase element (204) operates by producing sharp changes in the phase distribution of the undesirable modes, so that their propagation losses are sufficiently high prevent their build-up. This is achieved by introducing a discontinuous phase change to these modes at locations where they have high intensity. At the same time, the desired modes suffer 0 or 2π phase change, or have low intensity at the discontinuity, and so are unaffected by the discontinuous phase element. Such elements can be used in a single element or a double element configuration, and can be used in passive cavities or active cavities, such as lasers. In addition to being able to improve the output beam quality of a laser by encouraging output of the lowest order mode beam, they can also be used to improve the maximum power output of solid state lasers by encouraging the output of specific higher order mode beams, without limiting dynamic range of the laser. They can also be used to compensate for birefringence distortion in the gain medium.

